RESEARCH

Board of Trustees Report

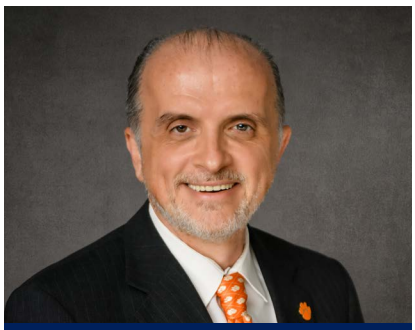
April 2023

From the Vice President for Research

Dear Trustees,

I hope you all are doing well and enjoying the long-awaited spring weather.

At the last Board of Trustees Research and Economic Development Committee meeting in February, I spoke about the far-reaching impact of large, interdisciplinary, multi-institutional projects, with examples of several programs that involve more than 200 faculty members and 237 graduate students across 37 departments. These are capacity-building programs that have long-lasting impact on our research talent and infrastructure.


Tanju Karanfil

I am excited to report that this list is growing. The U.S. Department of Transportation awarded Clemson $20 million over five years for the National Center for Transportation Cybersecurity and Resiliency (TraCR). Clemson will lead nine other universities on the project that seeks to secure our evolving transportation systems from cyber attacks. Only five universities were chosen to lead such centers. You can read more about it on pages 16-17.

Our Eukaryotic Pathogens Innovation Center celebrated its 10th Anniversary with an $11 million Phase 2 Centers of Biomedical Research Excellence (COBRE) award. EPIC has secured $50 million in external funding over the past decade (page 18). Incredible.

The U.S. Department of Education awarded Clemson $5.8 million to help expand school counseling in Greenville County (page 19).

We also received a $10 million award from the U.S. Department of Agriculture to study the use of saline waters in agricultural production as an alternative to freshwater, which is in limited supply (page 21), and a $6.9 million grant to find a natural, safe solution to costly problem of marine biofouling (page 22)

Our faculty continue to generate successful research endeavors, as is evidenced by our strong research metrics through the second quarter of fiscal year 2023:

- Competitive expenditures, which include funds only from competitively bid projects, were up 10 percent at $70 million in the second quarter of fiscal year 2023, compared to the same quarter the prior fiscal year (page 6).
- During the second quarter of FY2023, proposal submissions remained strong at $406 million, up 18 percent from the prior-year quarter. (page 7).
- Research awards increased 36 percent to $103 million in the second quarter of FY2023, continuing the strong momentum in competitive awards received (page 8).

Additionally, we just reported our total R&D expenditures for 2022 to the National Science Foundation Higher Education Research and Development (HERD) Survey, and I am pleased to report that Clemson's total R&D has surpassed $250 million for the first time. Total R&D expenditures reached $263 million in 2022, an increase of 11 percent from 2021 (page 5). Our survey report is under review and total R&D expenditures for all universities will be published by NSF in the fall.

Of course, none of this is possible without the work of our faculty, students and staff. I have highlighted several of their accomplishments on pages 25-29. With so much great work happening

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From the Vice President for Research

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at Clemson, picking our annual Researcher of the Year will be a difficult task. We have recently announced our nominees (pages 30-31) and will announce the winners at the 7th Annual Research Symposium at the Watt Family Innovation Center on May 10. I would like to invite you all to attend if you are available. This is a great celebration of our successes and serves as a launch point for new interdisciplinary collaboration as faculty from all colleges get together to share ideas.

Our Focus on Faculty section in this edition of the Research Report highlights our junior faculty. Our junior faculty have been incredibly successful earning highly competitive early CAREER awards recently. These are career catalysts for our rising faculty, and in fact, many of Clemson's past early CAREER recipients have advanced to become our most active, impactful scholars. These awards have been an emphasis for us, and Clemson has among the highest rates of CAREER awardees among its faculty body when compared to peer institutions (pages 33-34).

I invite you to learn about these junior faculty and others in our Focus on Faculty section (pages 32-41). These are the future leaders of our institution and of their respective fields. They prove the future is bright.

Go Tigers!

Respectfully submitted,

Tanju Karanfil, Ph.D., PE, BCEE, IWA Fellow

Vice President for Research, Clemson University

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RESEARCH

RESEARCH METRICS

This section covers institutional research productivity with data on proposal submissions, awards and expenditures.

Executive Summary

- Clemson reported total R&D expenditures of $263 million for 2022 to the National Science Foundation Higher Education Research and Development (HERD) Survey. This is an increase of 11 percent from 2021 and marks the first time Clemson has surpassed $250 million (page 5). The survey report is under review and total R&D expenditures for all universities will be published by NSF in the fall.

- Competitive expenditures, which include funds only from competitively bid projects, were up 10 percent at $70 million in the second quarter of fiscal year 2023, compared to the same quarter the prior fiscal year (page 6).

- During the second quarter of FY2023, proposal submissions remained strong at $406 million, up 18 percent from the prior-year quarter. (page 7).

- Research awards increased 36 percent to $103 million in the second quarter of FY2023, continuing the strong momentum in competitive awards received (page 8).

- A list of the top 10 awards received during the second quarter is included on pages 9-10.

- The research report card provides additional information, including research metrics per college, innovation cluster and business unit (pages 11-14).

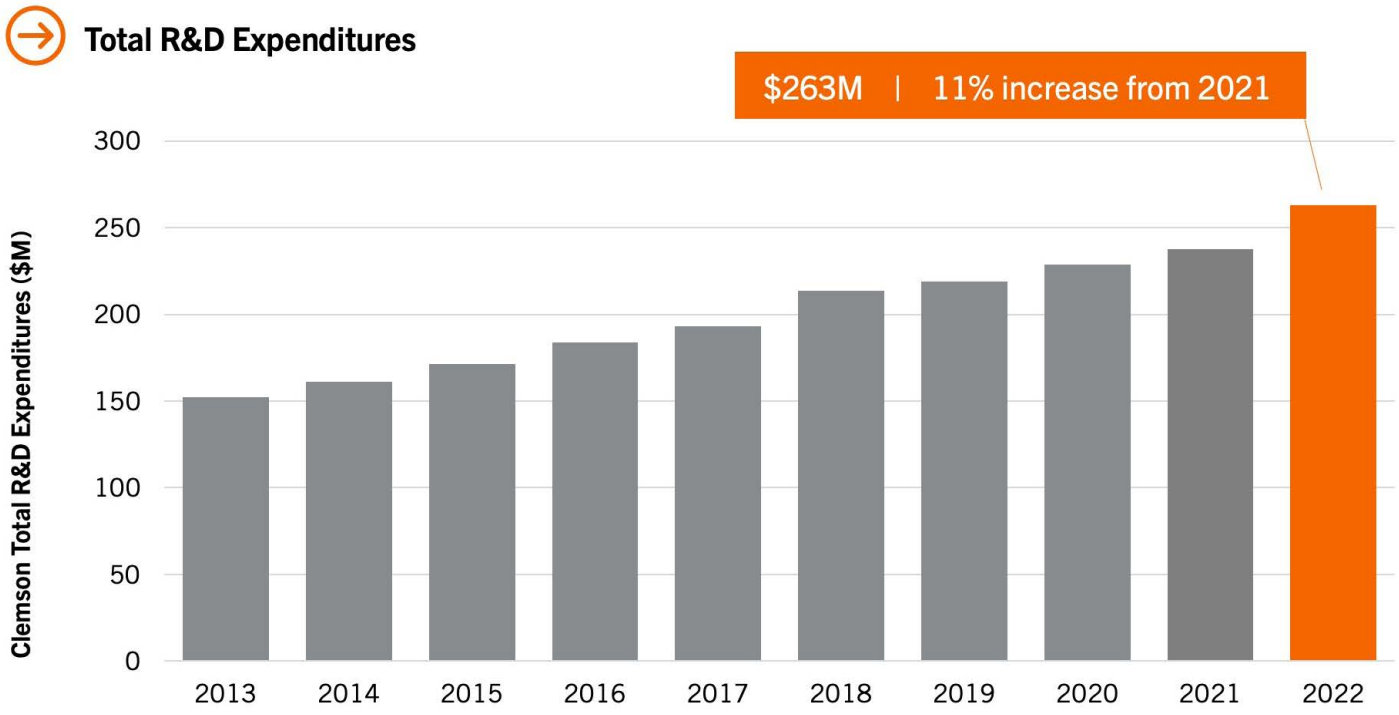
Total R&D expenditures continue to increase

Clemson has officially posted its Total R&D Expenditures for 2022 to the National Science Foundation Higher Education Research and Development (HERD) Survey.

Clemson's total R&D expenditures continued to increase in 2022 to $263 million, as shown in the chart below. This data includes expenditures on all research revenue, including state support, gifts, external research services, competitive awards, and other sources.

The HERD Survey is the primary source of information on research and development expenditures at U.S. colleges and universities. The survey collects information on R&D expenditures by field of research and source of funds and also gathers information on types of research, expenses, and headcounts of R&D personnel.

Total R&D expenditures from the HERD Survey are used in the Carnegie Classification and allow for an apples-to-apples comparison of research expenditures at peer Carnegie R1 institutions. The 2022 survey report is under review and total R&D expenditures for all universities will be published by NSF in the fall.



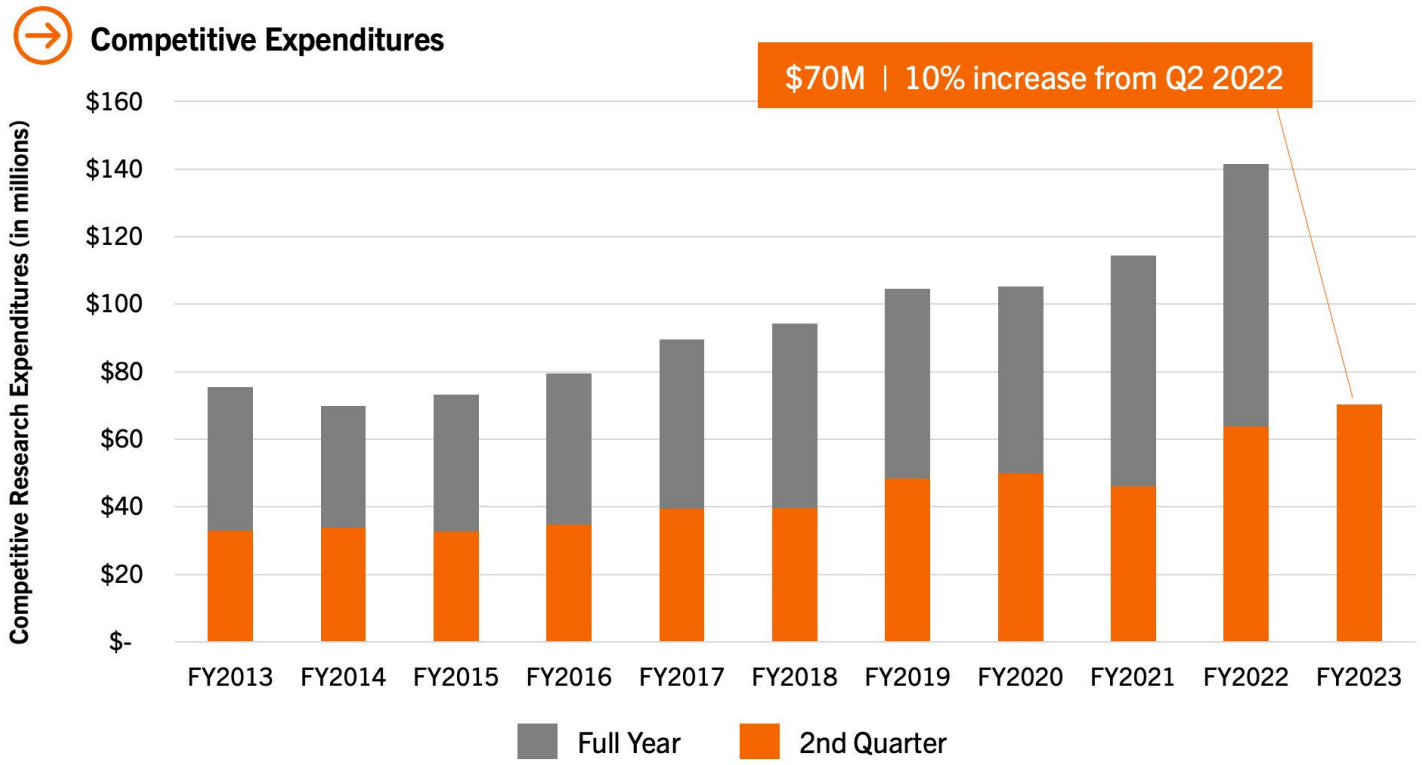
SOURCE: NSF Higher Education Research and Development (HERD) Survey

Competitive expenditures up from prior year

Competitive expenditures were $70 million in the second quarter of FY2023, an increase of about 10 percent from FY2022, which was a banner year.

Competitive expenditures include funds only from competitively bid projects, such as highly competitive federal grant awards. Competitive expenditures have increased greatly at Clemson over the past decade, reaching a high point of $141 million in FY2022. This is attributed to the high-quality proposals submitted by faculty, as gains in expenditures have greatly outpaced increases to the size of the faculty body.

Additional details on expenditures by business unit, innovation cluster and funding source are included in the Research Report Card on page 13.

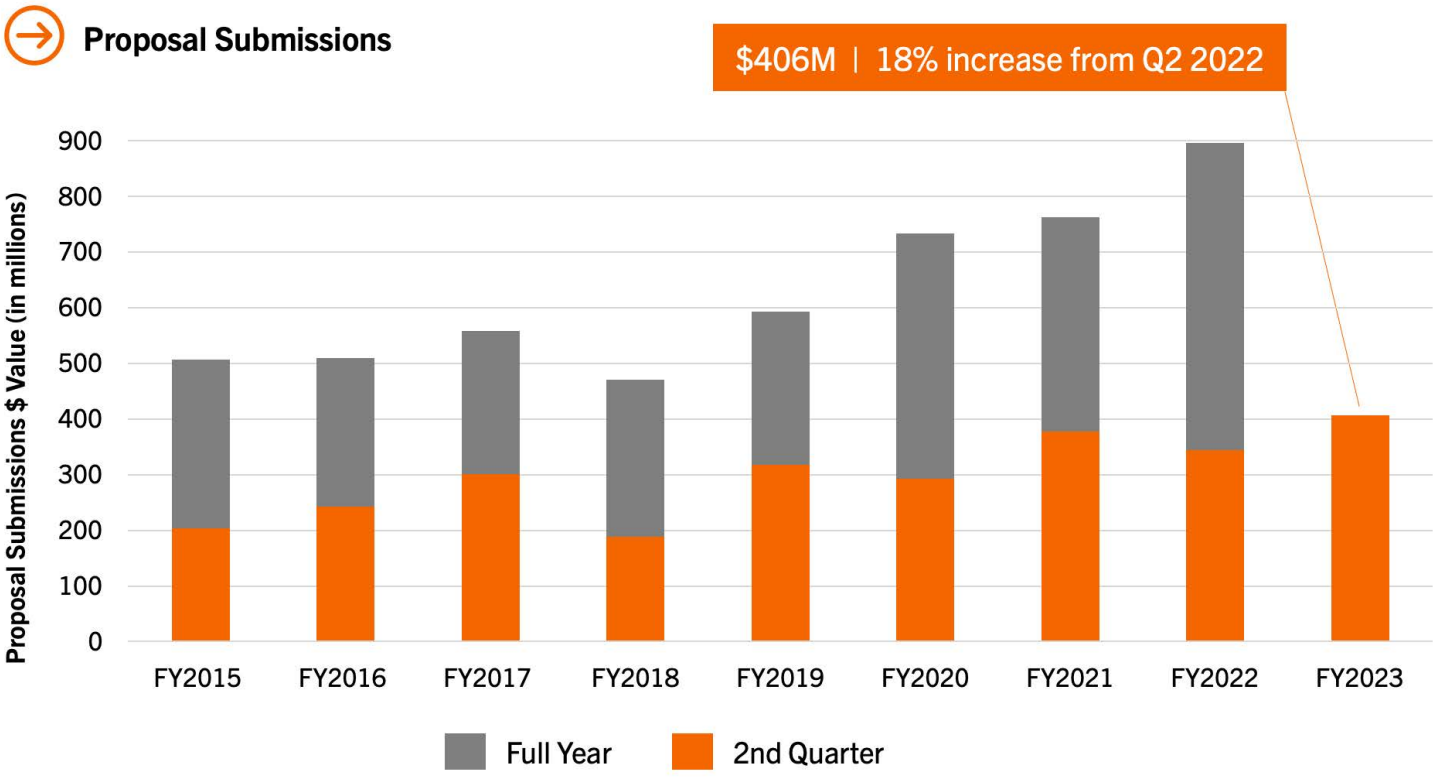


Proposal submissions

Proposal submissions have increased consistently over the past five years as Clemson faculty seek funding for scholarship and discovery. FY2022 saw submissions spike to $896 million, an increase of nearly 18% from the prior year and more than 132% from FY2013.

During the second quarter of FY2023, proposal submissions remained strong at $406 million, up 18 percent from the prior-year quarter.

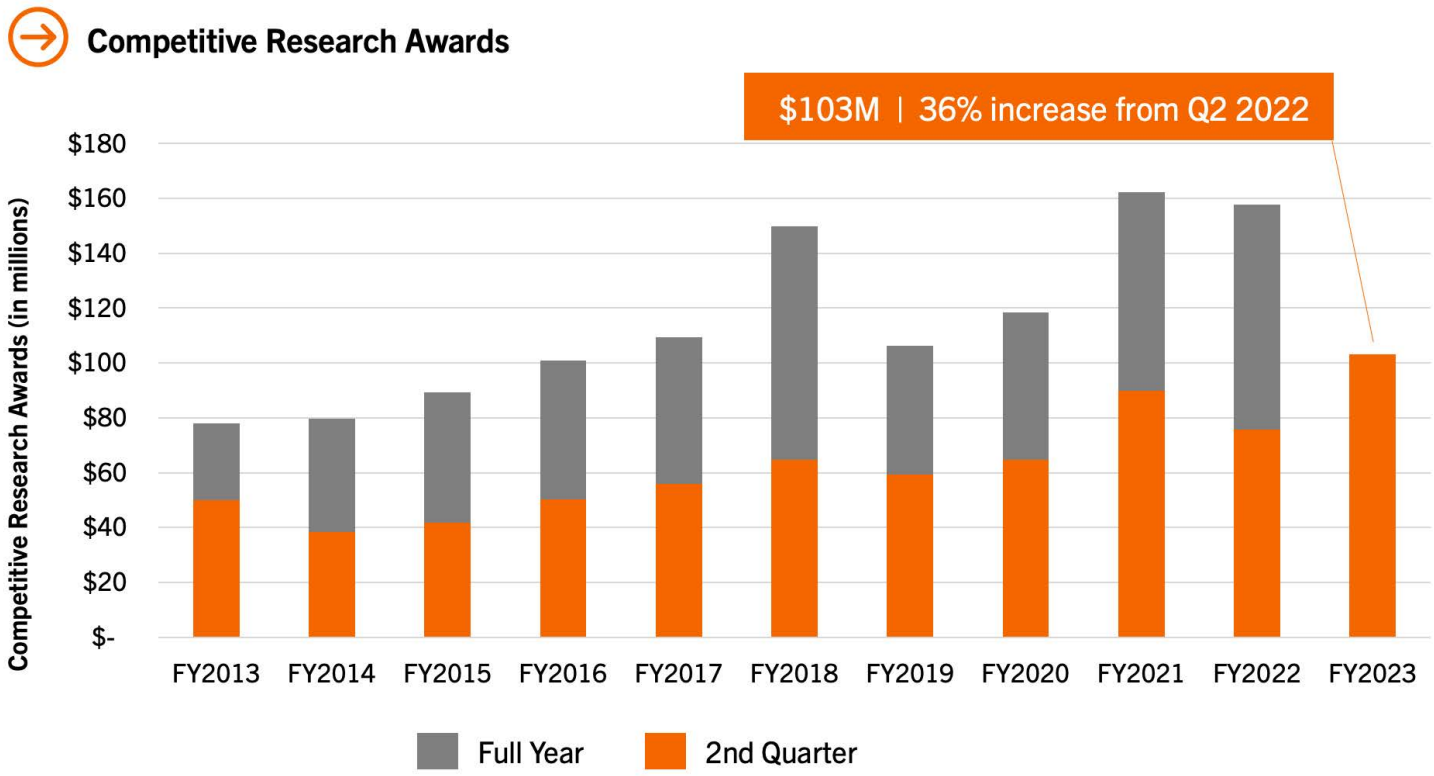
Additional details on the number and value of proposal submissions for each college are included in the Research Report Card on page 11.



Competitive Research Awards

Funding agencies continue to reward high-quality proposals and ideas from Clemson faculty. In particular, Clemson faculty are earning higher value awards of $2 million and more, as shown in the graphic at the bottom of the page. This is fueling an ongoing upward trajectory in research awards received, as shown in the chart below. FY2021 was particularly strong with awards up 37 percent from the prior year. FY2022 was another strong year with awards reaching $158 million, topping $150 million for the third time in the past five years. Momentum continued in the second quarter of FY2023, with awards increasing 36 percent to $103 million.

Additional details on awards per college are included in the Research Report Card on page 12.



Earning High-Dollar Awards

81 RESEARCH AWARDS OF AT LEAST $2M WON SINCE 2015

THE TOTAL VALUE OF THESE PROJECTS IS **$437 MILLION**

Top Competitive Awards (second quarter FY2023)


Karig

David Karig, associate professor of bioengineering, received $6.9 million from the Defense Advanced Research Projects Agency to develop communities of marine microbes that form smooth, stable biofilms to reduce drag and fouling (the accumulation of marine organisms on underwater surfaces) on unmanned underwater vehicles. This framework for engineering protective, stable and resilient biofilms could be extended to address an array of challenges caused by fouling in oil production, water treatment, fuel tanks, the food and beverage industry, and nuclear power plants.

Rhondda Thomas, Calhoun Lemon Professor of Literature, received $3.4 million from the Mellon Foundation to support the creation of a Black Heritage Trail on campus and in the cities of Seneca and Clemson. The Black Heritage Trail will feature walking trails that connect heritage sites with interactive signs, artwork and digital content that share the stories of local Black history and South Carolina historical markers at significant historic sites.


Thomas


Kozubowski

Lukasz Kozubowski, associate professor of genetics and biochemistry, received $1.9 million from the National Institutes of Health for his research into finding safer and more effective drugs that target fungal infections, which can be dangerous and even deadly, especially for immunocompromised people such as transplant recipients and those with HIV/AIDS. Concerns are rising globally about the need for drugs that can safely treat fungi such as Cryptococcus neoformans, which can attack the brain as cryptococcal meningitis.

James Hollis, director of the S.C. Meat Poultry Inspection Department, received $1.8 million from the U.S. Department of Agriculture in support of the meat inspection program. The S.C. Meat Poultry Inspection Department at Clemson is a public health regulatory agency with public service and educational functions. Its mission is to protect the health of consumers by providing a comprehensive inspection service to assure that meat and poultry products are safe and accurately labeled.


Crichton

Meredyth Crichton, executive director of the Dominion Energy Innovation Center, received $1.8 million from an industry sponsor. Located at the Clemson University Restoration Institute in North Charleston, the Dominion Energy Innovation Center houses the Duke Energy eGRID, an electrical grid simulator, and the world's most-advanced wind-turbine drivetrain testing facility capable of full-scale, highly accelerated mechanical and electrical testing of advanced drivetrain systems for wind turbines.

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Top Competitive Awards (second quarter FY2023)

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Watkins

Joe Watkins, chair of general engineering, received $1 million from the U.S. Army through a collaborative project with the University of Alabama-Huntsville for research on advanced laser systems. Beams of directed energy (DE) can address threats at the speed-of-light and are especially critical to counter future hypersonic weapons. This project utilizes cutting-edge optical materials and structured light engineering capabilities within Clemson University's Center for Optical Materials Science and Engineering Technologies.

Ksenija Gasic, professor of plant and environmental sciences, received $860,941 from the U.S. Department of Agriculture through a collaboration with Washington State University for support of specialty crop-breeding research. Specifically, Gasic will help facilitate the collection and distillation of public genomics, genetics and breeding Rosaceae tree fruit research data for inclusion in the Genome Database for Rosaceae used to advance science in the field.


Gasic


Litwin

Alain Litwin, professor of practice in the Department of Psychology and co-director of the Clemson Center on Addiction and Mental Health Research, received $720,000 from the S.C. Department of Health and Environmental Control. This project researches diagnosis and treatment of opioid use disorder and treatment of IV drug-use viral infections, including Hepatitis C.

Alex Chow, professor of forestry and environmental conservation, received $645,719 from the U.S. Department of Energy to study the impact of wildfires on forest ecosystems, specifically the impacts of both fire and post-fire rainstorms on organic carbon and nitrogen in burned terrestrial and aquatic ecosystems. Chow will collaborate with the USDA Forest Service and Oak Ridge National Laboratory to conduct watershed-scale wildfire experiments at the Department of Energy Savannah River Site.


Chow


Sherrill

Windsor Westbrook Sherrill, associate vice president for health research, received $600,000 from the American Diabetes Association to evaluate the implementation of clinical decision support tool to enable access and referral to a community-based diabetes self-management education and support program. These programs help people living with diabetes choose food and activities to lower their blood sugar, reduce costs associated with diabetes, and ultimately improve health and lower the chance of developing other problems, such as stroke or blindness.

Research Report Card (FY2023 Second Quarter)

INDEX

CAAH: College of Architecture, Arts & Humanities

CAFLS: College of Agriculture, Forestry & Life Sciences

CBSHS: College of Behavioral, Social & Health Sciences

CECAS: College of Engineering, Computing & Applied Sciences

COE: College of Education

COB: College of Business

COS: College of Science

CCIT: Clemson Computing & Information Technology

PSA: Public Service & Agriculture

		2018	2019	2020	2021	2022	2023 Second Quarter	
a. Proposal Submissions by Number		1,451	1,417	1,729	1,583	1,492	699	
1	CAAH	64	69	76	61	35	13	
2	CAFLS	229	377	473	401	366	159	
3	CBSHS	101	105	143	151	151	74	
4	CECAS	587	562	672	596	631	275	
5	COE	37	39	42	37	43	22	
6	COB	10	5	11	14	9	8	
7	COS	227	186	219	229	193	110	
8	CCIT	1	1	1	-	-	-	
9	PSA	163	33	37	26	26	21	
10	VP for Res & Interdisc Inst	12	25	29	29	23	11	
11	All Other	20	15	26	39	15	6	
b. Proposal Submissions by Dollar Value (in millions)		$470M	$594M	$734M	$762.4M	$896M	$406M	FY2023 Targets
12	CAAH	$5.7	$4.4	$5.9	$5.6	$8.3	$7.4	$9.0M
13	CAFLS	$37.1	$68.4	$92.9	$84.1	$242.1	$63.3	$90.0M
14	CBSHS	$25.9	$87.5	$41.1	$64.3	$73.1	$38.1	$75.0M
15	CECAS	$235.5	$255.3	$405.9	$342.9	$380.8	$176.6	$390.0M
16	COE	$19.1	$10.1	$18.9	$22.4	$32.3	$22.8	$26.3M
17	COB	$1.8	$2.1	$2.9	$4.2	$4.8	$3.1	$5.6M
18	COS	$100.4	$73.8	$129.3	$175.4	$127.3	$75.2	$142.5M
19	CCIT	$0.9	$4.6	$3.0	$0.02	$0.7	$0.05	-
20	PSA	$25.8	$11.4	$6.4	$5.6	$7.8	$11.7	$11.3M
21	VP for Res & Interdisc Inst	$12.7	$68.5	$19.8	$22.3	$11.0	$3.3	
22	All Other	$5.0	$7.4	$7.7	$35.7	$8.3	$4.7	

Research Report Card (FY2023 Second Quarter)

		2018	2019	2020	2021	2022	2023 Second Quarter
c. Research Awards (in millions)		$149.8M	$106.3M	$118.3M	$162.2M	$157.6M	$103.2M
23	CAAH	$1.9	$2.0	$1.4	$1.4	$1.3	$1.8
24	CAFLS	$13.9	$14.2	$22.3	$24.2	$19.9	$9.3
25	CBSHS	$8.1	$5.9	$7.7	$17.4	$13.7	$6.4
26	CECAS	$80.8	$50.4	$48.0	$75.0	$76.4	$55.2
27	COE	$4.5	$3.3	$2.3	$5.1	$5.7	$3.7
28	COB	$1.1	$0.8	$1.2	$0.2	$0.9	$1.0
29	COS	$14.7	$18.7	$14.2	$25.4	$17.8	$12.4
30	CCIT	$1.3	$0.1	$0.3	$0.7	$0.2	-
31	PSA	$6..6	$4.0	$4.1	$5.8	$6.9	$6.3
32	VP for Res & Interdisc Inst	$15.1	$6.2	$14.6	$5.1	$6.6	$5.1
33	All Other	$1.7	$0.7	$2.2	$1.9	$8.2	$2.1
d. National Young Investigator Awards		8	6	10	10	1	5
34	NSF CAREER Awards (by start date)	7	4	6	9	1	4
35	NIH KO1	1	-	1	-	-	-
36	Air Force Young Investigator Awards	-	1	-	-	-	1
37	Army Young Investigator Awards	-	-	1	-	-	-
38	DARPA Young Investigators Awards	-	-	1	-	-	-
39	EPA Early Career Awards	-	1	-	-	-	-
40	DOE Early Career Awards	-	-	-	1	-	-
41	Department of Homeland Security	-	-	-	-	-	-
42	Dept. of Ed. Inst. of Educational Sciences	-	-	1	-	-	-
e. Supporting Workforce							
43	Graduate Student Enrollment	4,985	5,282	5,627	5,538	5,448	6,404
44	Sponsored Graduate Research Assistants	761	558	637	546	729	736
45	Postdoctoral Fellows	97	98	98	106	117	116
46	Research Faculty: Permanent 100% Non-E&G Funded	14	11	18	12	2	3
47	Research Faculty: Temporary 100% Non-E&G Funded	27	29	54	45	32	29

Research Report Card (FY2023 Second Quarter)

		2018	2019	2020	2021	2022	2023 Second Quarter
f. Sponsored Research Expenditures by Business Unit (in millions)		$94.2M	$104.5M	$105.3M	$114.4M	$141.4M	$70.2M
48	CAAH	$1.4	$1.7	$1.6	$1.1	$1.3	$0.6
49	CAFLS	$11.0	$14.1	$16.4	$15.0	$17.8	$8.4
50	COB	$0.8	$0.8	$0.7	$0.7	$0.7	$0.4
51	CECAS	$45.1	$50.3	$46.4	$54.4	$71.7	$34.7
52	CBSHS	$4.9	$5.3	$6.7	$9.0	$12.0	$6.8
53	COE	$2.2	$2.5	$2.4	$2.3	$3.8	$2.2
54	COS	$16.7	$17.2	$17.3	$15.9	$18.5	$10.3
55	CCIT	$0.6	$0.2	$0.1	$0.2	$0.4	$0.1
56	PSA	$5.9	$3.7	$3.9	$5.5	$7.2	$4.5
57	VP for Res & Interdisc Inst	$3.9	$7.1	$9.5	$9.6	$7.0	$3.0
58	All Other	$1.6	$1.5	$0.4	$0.7	$1.1	$0.5
g. Sponsored Research Expenditures by Innovation Cluster (in millions)		$94.2M	$104.5M	$105.3M	$114.4M	$141.4M	$70.2M
59	Advanced Materials	$12.1	$15.4	$13.5	$14.3	$18.6	$9.2
60	Cyberinfrastructure & Big Data Science	$9.6	$6.9	$4.4	$5.5	$8.2	$3.4
61	Energy, Trans. & Advanced Manufacturing	$16.8	$17.1	$14.5	$19.9	$27.7	$14.2
62	Health Innovation	$17.8	$23.8	$27.1	$27.1	$26.3	$13.8
63	Human Resilience	$8.6	$9.0	$9.7	$12.7	$14.8	$7.9
64	Sustainable Environments	$19.5	$20.6	$23.9	$21.3	$26.8	$14.2
65	Other	$9.6	$11.7	$12.1	$13.6	$19.6	$8.9
h. Sponsored Research Expenditures by Funding Source (in millions)		$94.2M	$104.5M	$105.3M	$114.4M	$141.4M	$70.2M
66	Federal Government	$78.2	$85.1	$85.2	$95.1	$125.1	$62.8
67	Foundations, Societies, and Associations	$5.1	$7.4	$6.9	$6.2	$4.6	$2.4
68	Industry/Other	$6.3	$5.3	$5.5	$4.8	$4.8	$2.8
69	International	$0.4	$0.3	$0.3	$0.4	$0.5	$0.3
70	Local Government	$0.5	$0.5	$0.5	$0.8	$0.9	$0.4
71	State Government	$3.7	$5.7	$6.8	$7.3	$6.2	$3.0

Research Report Card (FY2023 Second Quarter)

		2018	2019	2020	2021	2022	2023 Second Quarter
i. Sponsored Research Expenditures per T/TT Faculty by College							
72	CAAH	$8,945	$10,159	$10,003	$6,912	$8,266	$3,978
73	CAFLS	$103,814	$134,555	$137,438	$131,195	$139,844	$64,760
74	COB	$8,269	$8,200	$6,991	$7,132	$6,787	$4,127
75	CECAS	$214,280	$225,620	$201,553	$223,843	$296,203	$140,110
76	CBSHS	$39,532	$40,301	$50,495	$67,202	$90,220	$49,029
77	COE	$40,197	$47,371	$47,742	$48,805	$80,058	$48,738
78	COS	$110,206	$118,600	$116,020	$107,258	$120,778	$64,574
79	Clemson Average	$103,706	$99,125	$96,497	$103,187	$142,129	$69,363
j. Additional information							
80	NIH R01-Equivalent Awards (by start date)	3	6	1	3	1	4
81	Doctorates Awarded	234	301	249	225	242	84
82	STEM Doctorates Awarded	171	174	162	159	172	60
83	Disclosures	51	62	68	44	50	29
84	Patents	11	18	12	15	9	6
85	Licenses/Options	11	19	13	13	27	7
86	Licensing Revenue	$461,755	$398,136	$315,578	$239,074	$380,286	$108,125
87	Start-up Companies (based on licenses/options)	3	5	1	1	4	3

RESEARCH NEWS

This section highlights research news from across the university.

Executive Summary

- The U.S. Department of Transportation awarded Clemson $20 million to launch the National Center for Transportation Cybersecurity and Resiliency (TraCR) (pages 16-17).
- Eukaryotic Pathogens Innovation Center (EPIC) has brought $50 million to Clemson since it was founded in 2013, including a recent $11 million Center for Biomedical Research Excellence Phase 2 award (page 18).
- The U.S. Department of Education awarded Clemson $5.8 million to identify and educate current Greenville County Schools employees who seek to become school counselors (page 19).
- The U.S. Department of Agriculture awarded Clemson $10 million to study the use of saline waters in agricultural production as an alternative to limited freshwater (page 21).
- The Defense Advanced Research Projects Agency (DARPA) awarded Clemson $6.9 million to develop a solution to a multimillion-dollar problem facing the marine industry (page 22).
- Anjali Joseph, an acclaimed researcher helping to improve the design of health care facilities, will discuss her research at the upcoming Research and Economic Development Committee meeting (page 23).
- Nathan McNeese, assistant professor of human-centered computing, was named junior Researcher of the Year at Clemson University in 2022. He will discuss his research at the upcoming Research and Economic Development Committee meeting (page 24).
- Clemson faculty and students have earned several accolades for their work (pages 25-29).
- Clemson has announced nominees for its 2023 Researcher of the Year (pages 30-31).

Clemson to lead national transportation center

Clemson University is opening a national center where researchers will devise new ways of hardening the transportation system against cyberattack as a growing number of vehicles and more of the world's infrastructure rely on the internet to move people and goods safely and efficiently.

The new National Center for Transportation Cybersecurity and Resiliency (TraCR) is set to receive $20 million from the U.S. Department of Transportation over a five-year grant period. Clemson was one of only five universities selected this year by the Department of Transportation to lead national University Transportation Centers.

Researchers expect to develop software and hardware that will be designed as an ironclad defense against cyberattack. Wirelessly connecting vehicles to each other and to the roadway infrastructure holds the promise of reducing gridlock, crashes, fuel use, emissions and social inequities.

However, it also opens the transportation system to a host of cyberthreats from individual hackers, criminal gangs, terrorists and other bad actors. With every vehicle and piece of infrastructure that connects to the internet, there is an opportunity to steal data, invade privacy, demand a ransom, generate misinformation or even shut down a whole system. The 2021 ransomware attack on a pipeline that supplies much of the East Coast with gasoline and jet fuel is a recent reminder of the vulnerability an increasingly connected and wireless nation faces.

The new center will put Clemson on the country's frontline defense

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By The Numbers

$20M
in funding over 5 years

1 of 5
universities selected nationally

10
university collaborators, including Clemson

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in combatting these infrastructure attacks, with Mashrur "Ronnie" Chowdhury serving as the principal investigator and the center's director. Partnering institutions are Benedict College, Florida International University, Morgan State University, Purdue University, South Carolina State University, the University of Alabama, the University of California, Santa Cruz, and the University of Texas at Dallas.

The center's researchers plan to consider myriad forms of transportation, ranging from cars, trucks, and bicycles to passenger rail, maritime shipping, and pipelines.

Chowdhury, the Eugene Douglas Mays Chair of Transportation at Clemson, said he looks forward to the challenges the center's team will face and, more importantly, to the contributions its members will make nationwide.

"We will develop a comprehensive platform so that anyone involved in transportation will be able to defend against any cyberattack," he said. "The platform will help detect threats and will be adaptive and resilient so that we will be able to fend off attacks that hackers haven't even invented yet. We are also going to examine quantum computing, looking at how to evaluate threats from quantum computers and how quantum computers can be used to defend against cyberattack."

Researchers in the new center will come from a wide range of backgrounds, bringing their expertise in everything from engineering, physics, and planning to psychology, logistics, and finance. They have included a plan for equity aimed at helping ensure cybersecurity and resiliency are enhanced but do not harm communities and the people in them.

> "We will develop a comprehensive platform so that anyone involved in transportation will be able to defend against any cyberattack.
>
> **Mashrur "Ronnie" Chowdhury,** Director, National Center for Transportation Cybersecurtity

It is Clemson's second federally funded University Transportation Center. The first, the Center for Connected Multimodal Mobility (C2M2), was founded in 2017 and was also directed by Chowdhury. In 2021, the center received the IEEE ITS Institutional Lead Award, citing it for "contributions to cyber-physical transportation systems by addressing sensing, communication and computing aspects of computerized mobility."

Researchers with C2M2 turned campus itself into a testbed, wiring roads with sensors, and deploying computing devices and communication equipment.

READ MORE

EPIC: Life-saving infection disease research

More than a decade ago, six mostly junior Clemson University faculty members who studied eukaryotic pathogens realized they could accomplish more together than they could as individuals. But even they didn't realize how much of a difference the Eukaryotic Pathogens Innovation Center (EPIC) would make.

EPIC, which celebrates its 10th anniversary this year, is an interdisciplinary research cooperative founded in 2013 to study the organisms responsible for infectious diseases that threaten the health of billions of people worldwide.

Over the past decade, EPIC received more than $50 million in federal funding, including a recent five-year, $11 million National Institutes of Health Center for Biomedical Research Excellence (COBRE) Phase 2 award.

"We were thinking big, but none of us appreciated how much becoming a center and receiving a COBRE grant would fuel growth," said Lesly Temesvari, Alumni Distinguished Professor in the Department of Biological Sciences and one of EPIC's founders.

In 2013, EPIC had six faculty members — James Morris, Meredith Morris, Kerry Smith, Cheryl Ingram-Smith, Kim Paul and Temesvari — from two departments, biological sciences and genetics and biochemistry. It has grown to 15 faculty members from five departments in three colleges.

> "We're building capacity for the University. The entire University benefits from EPIC's success.
>
> **James Morris,**
> Professor, Genetics and Biochemistry

EPIC is at the forefront of biomedical research on eukaryotic pathogens that cause some of the most devastating and intractable human diseases, including malaria, amoebic dysentery, sleeping sickness, Chagas disease and fungal meningitis. While these diseases caused by parasitic and fungal infections seem a world away, they're not. Because of the ease of international travel and climate change, diseases once considered mainly tropical and subtropical have been increasingly found in the U.S.

EPIC landed a $10.5 million Center of Biomedical Research Excellence grant from the National Institutes of Health in 2016. The grant provided funds for five junior faculty, four research technicians, 11 Ph.D. graduate students and administrative personnel. It created a network of external mentors to offer guidance and expertise to junior scientists so they could secure their own funding. It also provided money to support two core facilities available to all researchers at Clemson: the Light Imagining Facility — which houses an array of advanced light microscopes, a laser microdissection system and a polarized light microscope — and the Genomics and Bioinformatics Facility.

Now, it has received a five-year, $11 million COBRE Phase 2 grant to support the hiring of four additional faculty members and the training of four junior faculty members through internal and external advisers and workshops. It will also pay for additional personnel for the Genomics and Bioinformatics Facility and continue to support the Light Imaging Facility. READ MORE

Clemson faculty boosting counseling support in schools with $5.8 million grant

A group of Clemson University faculty members is working with Greenville County Schools to make a positive impact on the ratio of students to school counselors in the district.

Faculty in the College of Education will use a $5.8 million award from the U.S. Department of Education over the next five years to identify and educate current Greenville County Schools employees who seek to become school counselors. The grant, which will fully cover tuition, will allow current teachers and other employees in the district to continue working while pursuing this opportunity.

The impact that school counselors can have on a school isn't limited to a single classroom; they have the privilege of serving an entire population of students. School districts strive to keep the ratio of students to counselors to a manageable number, as a high ratio leads to overburdened counselors and teachers pulled away from teaching to address more mental health and behavioral needs.

Elizabeth House, director of school counseling services for Greenville County Schools, shared that the district has the lowest ratio of students to school counselors in the state, but the district seeks to have more counseling support due to its size and its desire to increase diversity among school counselors. Amanda Rumsey, assistant professor in the College of Education and project leader, said that recruiting directly from the district will have numerous benefits for schools in both the short and long term.

"We will work to train people from the district who are already familiar with their schools, and we will focus on supporting all schools with special attention to those schools with the most need," Rumsey said. "More highly trained counselors ultimately help every teacher and student in the school system as well as the communities that surround them."

> "More highly trained counselors ultimately help every teacher and student in the school system, as well as the communities that surround them.
>
> **Amanda Rumsey,**
> Assistant Professor, College of Education

The project will recruit from Greenville County Schools and build cohorts of 12 students each year for four years. These cohorts will complete the College's counselor education program along with graduate students preparing to be school counselors and clinical mental health counselors. Rumsey envisions current teachers and other district employees taking advantage of the opportunity, as graduate students will retain employment in the school system and tuition will be covered entirely by the grant.

House said the district has great respect for Clemson's counselor education program, and she looks forward to the continued partnership with Clemson University.

READ MORE

Prestigious NEH grant to fund summer institute at Clemson to explore Black history

From left: Ashton, Robinson, Hecimovich and Thomas

This summer, faculty from Clemson University and Furman University will lead an effort to reconstruct Black history in South Carolina with support from the National Endowment for the Humanities (NEH).

Clemson English professors Susanna Ashton and Rhondda Thomas will join Furman faculty members Gregg Hecimovich and Kaniqua Robinson to lead a summer institute entitled "Reconstructing the Black Archive: South Carolina as Case Study, 1739–1895." The three-week residential institute is designed for 26 higher education faculty and graduate students to study ways of reconstructing Black histories, using South Carolina as a case study. The institute is supported by a $198,317 grant from the NEH.

"The Black archive demands new ways of looking," Ashton said. "If we look at census data, if we look at property records, if we look at court records—are there new questions we can ask of this material, perhaps in ways that push the boundaries of historical investigation?"

"The Black archive includes a diverse collection of documents, artifacts, materials that document the Black experience and the African diaspora," Thomas said. "So that would include everything from slave narratives to inventories of enslaved people to personal letters, journals, newspaper articles, photographs or artifacts that help to tell the story of Black people."

"The stories and records of African Americans are difficult to assemble, they are difficult to find in the standard archives," Hecimovich explained. "What we're doing in this project is we're drawing other scholars across the country together to collaborate with the tools that we've learned and that they are going to bring to us and their own challenges."

> "The assets of our two communities can really ccome together in a beautiful way.
>
> **Susanna Ashton,**
> Professor, English

"How we connect to the continent is disjointed because a lot of our history is oral, and it has not been documented in an equitable way, because our history was never given the same credit, or the same value," Robinson added.

The institute is designed for scholars from diverse disciplinary backgrounds and will have a special focus on the history of the Upcountry, Ashton said. The three-week institute will begin with 10 days at Clemson University, followed by nearly a week of travel to sites of historical significance throughout the state. It will finish with a week at Furman University.

Clemson researching use of saline water in agricultural production with $10M grant

A limited amount of freshwater threatens agriculture production and food security, but Clemson researcher Raghupathy Karthikeyan believes saline water could be a solution.

Karthikeyan, professor and Charles Carter Newman Endowed Chair of Natural Resources Engineering, has received a $10 million grant from the U.S. Department of Agriculture National Institute of Food and Agriculture (NIFA) to study development of a controlled environment agriculture (CEA) platform for growing salt-tolerant crops – mustard greens, cucumbers and tomatoes – using saline water for irrigation.

"In many freshwater-scarce regions, saline water sources such as brackish groundwater are available and can be used for irrigation," Karthikeyan said. "However, increased soil and land salinization restricts use of these water sources in traditional open-field cultivation, a problem that can be reduced by using hydroponic (soilless) cultivation in CEA. Several high-value food crops are salt sensitive but can be made more salt tolerant through breeding."

CEA covers a variety of systems, including greenhouses and modular containers, that take a technology-based approach to farming. These systems are designed to provide optimal growing conditions for crops and prevent disease and pest damage. Hydroponic agriculture is using a water-based nutrient solution rather than soil to grow plants. Controlled environment agriculture has a market value of more than $70 billion.

> "Several high-value food crops are salt sensitive but can be made more salt tolerant through breeding.
>
> **Raghupathy Karthikeyan,**
> Endowed Chair, Agricultural Sciences

The overall goal is to develop a hydroponics CEA platform for cultivating salt-tolerant food crops using saline irrigation water while ensuring no environmental impacts associated with salinity are created. Knowledge gained from this study will help growers use marginal quality water for year-round production.

The study will be conducted in vegetable growing areas of South Carolina and Florida and will be extended to Arizona. Objectives of the 5-year research, education and Extension project, which begins on April 1, include developing a hydroponic CEA platform, using saline waters for irrigation, managing salinity to better align with crop responses as the crops become acclimated to high salinity and selecting mustard greens, cucumber and tomato varieties for enhanced salt tolerance.

The project is a collaboration with the University of Florida and the U.S. Department of Agriculture's Agricultural Research Service. READ MORE

$6.9M grant supports effort to find safe, natural solution to major biofouling problem

A Clemson University researcher received $6.9 million from the Defense Advanced Research Projects Agency (DARPA) for the first phase of a project addressing a multibillion-dollar problem facing the marine industry.

Biofouling images by the International Maritime Organization

David Karig, associate professor of bioengineering, will lead a multi-institutional, international team of researchers to develop communities of marine microbes that form smooth, stable biofilms to mitigate biofouling, the accumulation of marine organisms on underwater surfaces such as ships. Biofouling increases drag, resulting in slower speeds and reduced fuel efficiency of large container vessels, increased pollution, and higher shipping costs and times.

Current antifouling technologies utilize chemical coatings that raise environmental concerns and still may be colonialized by microorganisms to some degree. Instead of preventing colonization, Karig's team will instead work to create a beneficial biofilm of microbes that will resist invasion from other marine organisms and function under changing environmental conditions.

> "To form smooth, stable biofilms, we will use natural marine microbes as building blocks, offering a natural, non-toxic, self-replicating, self-healing, and scalable solution.
>
> **David Karig,**
> Associate Professor, Bioengineering

"To form smooth, stable biofilms, we will use natural marine microbes as building blocks, offering a natural, non-toxic, self-replicating, self-healing, and scalable solution," Karig said.

Specifically, the team will focus on biofouling on unmanned underwater vehicles (UUVs). UUVs, like underwater drones, dive to various depths to collect data, offering a unique platform for testing Karig's biofilms under different shear forces, temperatures, pressures and chemical characteristics of the ocean. Advanced imaging techniques, DNA sequencing and computational modeling will help analyze and finetune biofilm performance.

The UUV tests will aid the development of biofilm products that Karig's team can further test in field operating conditions. If successful, this framework for engineering protective, stable and resilient biofilms could be extended to address an array of challenges caused by biofouling in healthcare, oil production, water treatment, and the food and beverage industry.

Collaborators on the project include researchers from Duke University, University of Essex, University of Copenhagen and Pompeu Fabra University.

PRESENTER SPOTLIGHT

Anjali Joseph

Professor, Spartanburg Regional Health System Endowed Chair in Architecture + Health Design

Joseph also serves as the Director of the Center for Health Facilities Design and Testing.

She is focused on studying the impact of the healthcare-built environment on patient and staff safety and quality of care outcomes. She collaborates closely with multidisciplinary teams at Clemson University and regional and national health systems to conduct evidence-based healthcare design research. Joseph utilizes simulation and prototyping methods to research and test the effectiveness of promising design solutions that impact patient safety in high-risk patient care environments.

Joseph has served as principal investigator on millions of dollars of grant-funded projects from the Agency for Healthcare Research and Quality (AHRQ), the Kresge Foundation, the California HealthCare Foundation and the U.S. Green Building Council. Her groundbreaking research on operating room design resulted in the development of a prototype OR, and the design concepts have been implemented in multiple ambulatory surgery centers across the U.S.

She currently serves as the principal investigator on a multi-year patient safety learning lab funded by AHRQ focused on developing solutions to improve the care and safety of children with mental and behavioral health conditions receiving care in the emergency department. This study is a collaboration with Prisma Health and the University of South Carolina.

Joseph was recognized as Researcher of the Year in 2018 by the Healthcare Design Magazine, and travels frequently to speak as a leader in the fields of architecture and health care. She serves on several boards including the International Advisory Board for the Swiss Center for Design and Health.

She obtained her Ph.D. with a focus on Architecture, Culture and Behavior from the Georgia Institute of Technology, master's degree in Architecture from Kansas State University and bachelor's degree in Architecture from the School of Planning and Architecture in New Delhi, India.

Joseph is available to discuss her research at the upcoming Board of Trustees Research and Economic Development Committee meeting.

PRESENTER SPOTLIGHT

Nathan McNeese

Dean's Professor and Assistant Professor of Human-Centered Computing

McNeese was named Clemson's junior faculty Researcher of the Year in 2022. For the purpose of this award, a "junior faculty" member is one who received his terminal degree within the past 10 years.

He serves as director of the Team Research Analytics in Computational Environments (TRACE) Research Group within the division of Human-Centered Computing. He also holds a secondary appointment in Clemson's Human Factors Institute, is a Faculty Scholar in Clemson's School of Health Research, and is a previous two-time Watt Family Faculty Fellow.

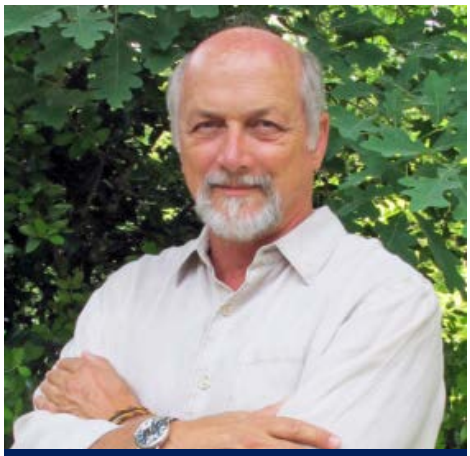
His area of expertise is in human-autonomy/AI teaming and human-centered AI. Throughout his research, he draws on both quantitative and qualitative methods including controlled experiments, contextual inquiry, participatory design, and ethnographic methods to better develop and utilize AI in a way that improves human lives and contributes positively to society. His work in human-autonomy/AI teaming has brought forth many landmark contributions that have helped to provide the foundation for the concept and build a larger community interested in the area.

He has been a principal investigator or co-principal investigator for more than 25 research grants and awards, generating more than $35 million in funding. His research work is funded by the National Science Foundation, Air Force Office of Scientific Research, Office of Naval Research, Army Research Office, Agency for Healthcare Research and Quality, Department of Education, and several other industry and state agencies. His research has received multiple best paper awards/nominations and has been published in top peer-reviewed human-computer interaction venues over 140 times.

McNeese is available to discuss his research at the upcoming Board of Trustees Research and Economic Development Committee meeting.

Impacts, Honors and Achievements

Clemson professor appointed to National Academies of Sciences, Engineering and Medicine Board



Machlis

A Clemson University professor will serve on a National Academies of Sciences, Engineering and Medicine Board designed to examine human interactions with the biophysical environment and integrate social and behavioral science research into environmental decision making.

Gary Machlis, University Professor of Environmental Sustainability in the College of Behavioral, Social and Health Sciences (CBSHS) and the College of Agriculture, Forestry and Life Sciences (CAFLS) at Clemson, has been appointed to the National Academies' Board on Environmental Change and Society (BECS) for a three-year term.

The Board on Environmental Change and Society utilizes board members' interdisciplinary expertise to identify solutions to emerging scientific and governmental concerns and offer evidence-based responses for the social, political, economic and equity dimensions of environmental change.

National Academies Boards are commissioned to conduct research and develop peer-reviewed consensus reports that guide policy and practice for challenges facing the nation and world. Currently, the BECS is reviewing a decadal study of climate change in an effort to understand its mitigation and adaptation from a social and behavioral science perspective.

READ MORE

Winton

Economics Ph.D. candidate named Farm Foundation 2023 Agricultural Scholar

Annaliese Winton, a fourth-year Ph.D. candidate in the John E. Walker Department of Economics, has been named 2023 Agricultural Scholar by Farm Foundation, an accelerator of practical solutions for agriculture.

"I am honored to have been selected as a 2023 Agricultural Scholar. I am thankful to the Farm Foundation and the United States Department of Agriculture's Economic Research Service for providing this immersive opportunity," Annaliese said.

This year-long program is offered in partnership with the U.S. Department of Agriculture's (USDA) Economic Research Service (ERS). Each year, up to 15 applied or agricultural economics graduate students are selected from across the nation as Agricultural Scholars. The program consists of a series of events and conferences in addition to mentorship from a senior analyst at the USDA's ERD. Its purpose is to train and inspire future agricultural economists.

READ MORE

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Impacts, Honors and Achievements

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Clemson wildlife professor recognized among most influential Black Americans

Lanham

Being listed among 2022's most influential Black Americans alongside icons such as Michelle Obama, Serena Williams and Questlove puts Drew Lanham in some lofty company indeed.

But as the only member of this year's The Root 100 who works in life sciences — as well as the only ornithologist on the list and one of only four in STEM fields, period — Lanham, in some ways, is in a class of his own.

The Clemson University Alumni Distinguished Professor of Wildlife Ecology came in at No. 99 on this year's list by the online publication and newsletter, The Root, which bills itself as "Black News and Black Views with a Whole Lotta Attitude."

The Root 100, now in its 13th year, is its annual listing of the most influential Black Americans, ages 24 to 74. And the list is not just a popularity contest, as the publication explains its methodology for the rankings from the onset.

"By using a unique algorithm, we calculate each honorees' REACH — the people they touch through media along with Twitter, Instagram and TikTok followers — and their SUBSTANCE — the impact of their work, graded on a scale of 0 to 10 — to discern their INFLUENCE, which determines their ranking," the website says.

Lanham is a widely published author and award-nominated poet, writing about his experiences as a birder, hunter and wild, wandering soul. His first solo work, "The Home Place: Memoirs of a Colored Man's Love Affair with Nature," was published in 2016-17.

READ MORE

Postdoctoral Fellow Mihir Parekh, holding a super capacitor that can harvest and store solar energy, speaks to Apparao Rao.

Researchers design a smart supercapacitor that harvests and stores solar energy

The sun is an abundant — but still largely untapped — energy source.

With the push for renewable energy, researchers from Clemson University and the Indian Institute of Science have designed a smart supercapacitor using a novel stack of metal oxides — vanadium pentoxide and zinc oxide — that can efficiently harvest energy from sunlight and simultaneously store it.

Like batteries, supercapacitors store and release electricity. But unlike batteries, supercapacitors don't need a chemical reaction to store energy. Instead, electric charge is stored electrostatically, which allows

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Impacts, Honors and Achievements

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supercapacitors to be rapidly charged and discharged. The research could pave the way for future self-charging consumer electronics such as health monitoring devices.

Although solar energy is renewable, one challenge is that it is harvested during the day when the sun is out and must be stored for future use. That traditionally required two separate devices — one to harvest the light into electricity and another to store it. Having both makes the overall system bulky. The researchers from the lab of Indian Institute of Science Professor Abha Misra and the Clemson Nanomaterials Institute (CNI) developed a smart device that converts light to electrical energy and stores it, reducing bulkiness.

READ MORE

Mercuri

Clemson University's Jeremy Mercuri appointed to leadership positions in partnerships with Prisma Health

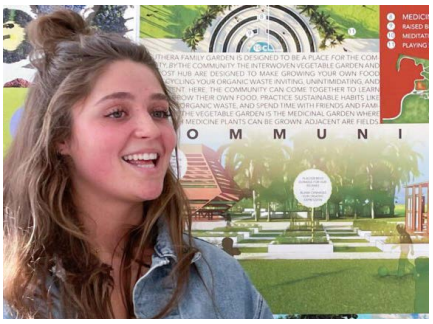
Jeremy Mercuri has been appointed deputy director of the Clemson University Biomedical Engineering Innovation Campus (CUBEInC) and faculty fellow in the Clemson University School of Health Research.

Mercuri joined Clemson's bioengineering faculty in 2013 and currently serves as the John Witherspoon Gilpin, M.D. '82 Endowed Associate Professor.

As part of his new duties, Mercuri will serve as the administrative lead for CUBEInC and facilitate programs in health education, research and innovation and Clemson's CUBEInC related partnerships with Prisma Health.

CUBEInC is a 30,000-square-foot facility devoted to education and translational research on Prisma Health's Patewood Hospital campus. The facility was opened in 2011 and has been home to numerous health innovation partnerships and initiatives, including biomedical start-ups and orthopedic research partnerships between Clemson and Prisma Health.

READ MORE



Landscape architecture students design sustainable master plan for storm-battered island in The Bahamas

The island of Eleuthera in the Bahamas has many attractive features—pink sand beaches, coral reefs, a rich culture—and one huge challenge: self-sustainability. Recently, Clemson University landscape architecture students partnered with the non-profit One Eleuthera Foundation (OEF) to design a vision for a sustainable future.

The undergraduate landscape architecture studio led by Professor Hala Nassar in Fall 2022 created a master plan for One Eleuthera Foundation's proposed Centre for Training and Innovation (CTI). Nassar noted that while Eleuthera's economy thrived in the first half

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Impacts, Honors and Achievements

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of the 20th Century, between 1965 and 1995, tourism and agriculture began to decline. In 2019, Hurricane Dorian dealt a blow with devastating damage and flooding.

"As these changes continue to threaten the local economy and environment, the island is exploring methods to adapt and enhance climate resiliency," Nassar said.

One Eleuthera Foundation currently owns a small resort hotel called "The Retreat" and several surrounding acres of farm and woodland, with a vision for more. The students' designs focus on four areas: the hotel, a farm, a community center, and a CTI campus. READ MORE

Trogden, left, and Burns

Clemson to lead the nation in developing civic education teaching tools

Two Clemson faculty members have been awarded a $500,000 grant from the Mellon Foundation to create a national hub to support the development of civic education materials in multiple higher ed courses. Associate Dean of Engagement and General Education Bridget Trogden along with Professor and Humanities Hub Director James Burns will lead the Civic Engagement and Voting Rights Teacher Scholars initiative.

"We see a problem right now with college students unable to make the connection between their coursework and civic outcomes from the past, present and future," Trogden said.

The initiative will center on a Summer Institute at Clemson, which will attract higher education faculty from around the country (Teacher Scholars) and serve as a kick-off for year-long faculty learning communities. Together, the Teacher Scholars will create open-source instructional materials for use by educators on college campuses across the country. The materials will not form a single curriculum, but they will provide resources for civics education that are ready-to-deploy, cross-curricular and pro-democracy.

READ MORE

Postdoctoral fellow Cherice Hill launches career at Clemson University with $1 million research project

Hill

Clemson University postdoctoral fellow Cherice Hill is leading a $1 million research project aimed at better understanding why a type of jaw disorder is more common among some groups than others.

As part of her research, Hill is studying why females suffer from temporomandibular disorders at higher rates than males and why African Americans have higher incidence yet lower prevalence of the disorders than white Americans.

Hill is conducting the research under the guidance of Hai Yao, professor, Ernest R. Norville Endowed

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Impacts, Honors and Achievements

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Chair of Biomedical Engineering and associate chair for the Clemson University-Medical University of South Carolina Bioengineering Program.

Funding for the research comes from a National Institutes of Health program, MOSAIC Postdoctoral Career Transition Award to Promote Diversity (K99/R00).

"It is rare for a postdoctoral fellow to receive this level of funding," Yao said. "The dollar amount is a testament to her hard work and passion for her research, community impact, and potential as a future faculty member. Her career is off to a stellar start at Clemson."

READ MORE

Krasowska

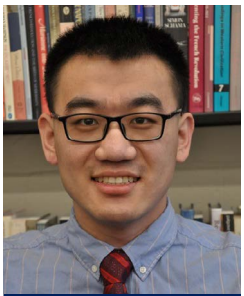
Computer engineering graduate wins research competition

David Krasowska, who graduated in December with a Bachelor of Science in computer engineering, won the student research competition at the Association for Computing Machinery's SC22 conference.

Krasowska's path through Clemson underscores how research enriches the undergraduate experience and helps prepare students to be leaders and innovators of the future. He has been conducting research with Jon Calhoun, an assistant professor of electrical and computer engineering.

Their work together focuses on lossy compression in high-performance computing for scientific applications. Lossy compression is a technique that involves discarding the least important information to reduce the amount of data for storing and processing. READ MORE

Physics' Wang wins prestigious Air Force Young Investigator Research Program Award



Wang

Clemson University physicist Yao Wang has received a prestigious 2023 Young Investigator Research Program Award from the Air Force Office of Scientific Research, the basic research arm of the Air Force Research Laboratory, to support his research on superconductivity. Wang is an assistant professor in the College of Science's Department of Physics and Astronomy.

Wang is the first AFOSR YIP recipient from Clemson's College of Science. AFRL/AFOSR awarded $25 million in grants to 58 scientists and engineers from 44 research institutions and businesses in 22 states for 2023.

Wang will receive $450,000 over three years for his research project investigating properties of superconductors.

Superconductors are one of the most attractive materials for modern science and are at the cornerstone of the next technological revolution. They have been applied to power transmission, quantum computing, controlled fusion, medical imaging and high-speed transportation. And they hold promise for other applications in industry and the military. READ MORE

RESEARCHER OF THE YEAR

The Researcher of the Year program recognizes the efforts of high-achieving faculty whose work is improving society through the generation and dissemination of new knowledge. The University recognizes one senior faculty member and one junior faculty member who received their terminal degree within the past 10 years. Faculty members are nominated by their colleges. Winners will be announced at the Research Symposium on May 10th.

Senior Faculty Nominees

listed alphabetically by first name

Anjali Joseph

Professor, Architecture

College of Architecture, Arts & Humanities

Jeff Anker

Professor, Chemistry

College of Science

Paula Agudelo

Professor, Plant & Environmental Sciences

College of Agriculture, Forestry & Life Sciences

Philip Roth

Professor, Management

Wilbur O. and Ann Powers College of Business

Robin Kowalski

Professor, Psychology

College of Behavioral, Social & Health Sciences

Sandra Linder

Professor, Teaching and Learning

College of Education

Srikanth Pilla

Professor, Automotive Engineering

College of Engineering, Computing & Applied Sciences

Click here to learn more about the nominees

RESEARCHER OF THE YEAR

The Researcher of the Year program recognizes the efforts of high-achieving faculty whose work is improving society through the generation and dissemination of new knowledge. The University recognizes one senior faculty member and one junior faculty member who received their terminal degree within the past 10 years. Faculty members are nominated by their colleges. Winners will be announced at the Research Symposium on May 10th.

Junior Faculty Nominees

listed alphabetically by first name

Claire Kirwin

Assistant Professor, Philosophy and Religion

College of Architecture, Arts & Humanities

Fadi Abdeljawad

Associate Professor, Mechanical Engineering

College of Engineering, Computing & Applied Sciences

Golnaz Aratoopour Irgens

Assistant Professor, Education and Human Development

College of Education

Matthew Browning

Associate Professor, Parks, Recreation and Tourism Management

College of Behavioral, Social & Health Sciences

Matthew Koski

Assistant Professor, Biological Sciences

College of Science

Richard Boyles

Assistant Professor, Plant & Environmental Sciences

College of Agriculture, Forestry & Life Sciences

Serkan Akturk

Assistant Professor, Management

Wilbur O. and Ann Powers College of Business

Click here to learn more about the nominees

RESEARCH

FOCUS ON FACULTY

This section features rising young junior faculty members at Clemson University.

Executive Summary

- Clemson junior faculty have been successfully earning prestigious early career awards, and Clemson has among the highest rates of early career recipients among its faculty body when compared to peers (page 33).

- Clemson junior faculty have received six prestigious early career awards already this year, including five National Science Foundation Early CAREER Awards (page 34) and a 2023 Young Investigator Research Program Award from the Air Force Office of Scientific Research. Several more proposals are pending and could lead to more awards.

- Each college provided a brief introduction to a select junior faculty member. Click the links below to read about faculty from the respective college.

  - College of Agriculture, Forestry and Life Sciences
  - College of Architecture, Arts and Humanities
  - College of Behavioral, Social and Health Sciences
  - Wilbur O. and Ann Powers College of Business
  - College of Education
  - College of Engineering, Computing and Applied Sciences
  - College of Science

Junior faculty are earning the nation's most prestigious awards for early career researchers

Numerous funding agencies offer grant programs available to early-career faculty. These highly competitive programs serve as catalysts to jumpstart the careers of the nation's most promising young faculty.

The National Science Foundation (NSF) calls its Early CAREER program "the most prestigious awards in support of early-career faculty who have the potential to serve as academic role models in research and education and to lead advances in the mission of their department or organization. Activities pursued by early-career faculty should build a firm foundation for a lifetime of leadership in integrating education and research."

Indeed, many of Clemson's past Early CAREER recipients have advanced to be some of Clemson's most active researchers. A list of current and past CAREER awardees at Clemson is posted online here.

An increasing number of Clemson faculty are earning these awards each year, and in fact, Clemson has among the highest rates of CAREER awardees among its faculty body when compared to peer institutions. The chart below shows the number of active NSF CAREER Awards per ladder rank instructional faculty as of 2023 at Clemson and peer institutions. Only Virginia Tech and Georgia Tech rank higher than Clemson.

Already this year, five Clemson faculty have earned NSF CAREER Awards and several proposals are still pending. Additionally, one Clemson faculty member has earned the Young Investigator Research Program Award from the Air Force Office of Scientific Research, the basic research arm of the Air Force Research Laboratory. You can read about that award on Page 29.

Read about this year's current NSF CAREER Award recipients on the next page.

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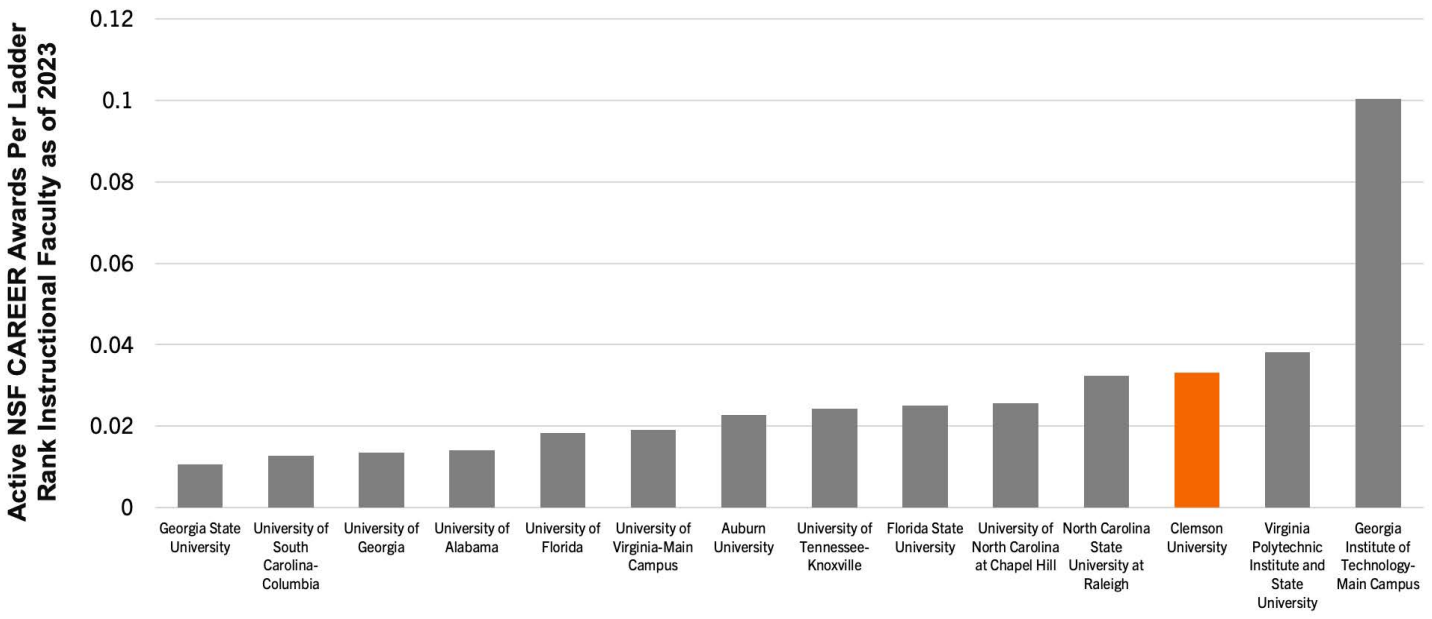
Clemson junior faculty successful earning prestigious CAREER awards



Early Career Awards

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The following Clemson junior faculty members have earned NSF CAREER Awards. At the time this report was prepared, three additional NSF CAREER proposals were under contract negotiations and could be funded.

Price

Samantha Price, assistant professor of biological sciences, received a $1.3 million NSF CAREER Award to advance her research on the repeating themes and general principles governing the evolution of biodiversity. In particular, Price plans to increase research opportunities for underrepresented students through the creation of the Classroom-based Undergraduate Research Experience (CURE) lab. The CURE lab will increase the number of students experiencing research in the Department of Biological Sciences by 50 percent, with at least 250 students participating over five years.

Suseela

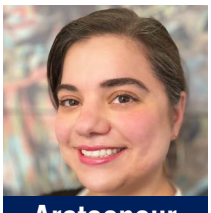
Vidya Suseela, assistant professor of plant and environmental sciences, received a $1.2 million NSF CAREER Award for her research on soil organic carbon. Suseela investigates the effect of plant functional types on the quantity, composition and stabilization of soil carbon and the associated nutrient cycling for improving the soil health and productivity of agroecosystems. Her work aims to enhance soil health, thus improving agricultural productivity, food security and human health while reducing environmental pollution and mitigating climate change.

Koski

Matthew Koski, assistant professor of biological sciences, received an $819,230 NSF CAREER Award for his study of the ecological and evolutionary processes that generate diversity in flowering plants. As part of his CAREER project, Koski will mentor at least 10 undergraduates from Clemson's Biological Sciences and Education programs through two newly formed Creative Inquiry (CI) courses. One group will use plots established in the Clemson Experimental Forest to conduct research and outreach with 4-H Junior Naturalists (K-12 students). The other student group will manage a Citizen Science project fueled by members of Native Plant Societies in seven states.

Afghah

Fatemeh Afghah, associate professor of electrical and computer engineering, received a $541,949 NSF CAREER Award for research on the use of Unmanned Aerial Vehicles (UAVs) in disaster management operations to collect data and imagery to inform rescue teams. Current operations often involve a single UAV remotely controlled by a commander or pilots in a manned aircraft relatively close to the danger-zone. Afghah will work to develop frameworks for a network of fully autonomous multi-agent systems with minimum human interventions.



Aratoopour Irgens

Golnaz Aratoopour Irgens, assistant professor of education and human development, received a $1.4 million NSF CAREER Award for a project to develop critical computing curriculum in elementary schools called CritComp Pop-ups, in which upper elementary students evaluate and develop AI technologies. The project involves 500 students, teachers, school administrators and researchers in the design and implementation of the curriculum. The research will take place in an area with schools with a high percentage of African Americans and youth in poverty.

College of
AGRICULTURE, FORESTRY AND LIFE SCIENCES

Michelle Parisi, PhD

Assistant Professor

Food, Nutrition and Packaging Sciences

Parisi, who also serves as Extension division director of health, nutrition and youth development, is a food systems and nutrition researcher who studies food access as a social determinant of health and the effect of chronic disease prevention and self-management programs delivered through an Extension model on individual health and wellbeing. Parisi collaborates with multi-disciplinary faculty and colleagues across the Colleges of Agriculture, Forestry, and Life Sciences (CAFLS) and Behavioral, Social, and Health Sciences (CBSHS). She is also working with Extension leaders at other Land Grant Universities to explore the potential for expanding health and nutrition programs piloted in South Carolina to other states. Strong internal and external partnerships with collaborative and innovative ideas have led to multiple grant awards and funding agreements amounting to more than $11 million over the last nine years. Parisi has a multi-state U.S. Department of Veterans Administration grant with the University of Florida to create culturally appropriate health and nutrition Extension education for U.S. veterans. She also has a National Extension Foundation grant to explore vaccine hesitancy in rural communities and identify Extension educational interventions for overcoming barriers.

Parisi has championed the Healthy Me, Healthy SC initiative in partnership with the Medical University of South Carolina. She has created a chronic disease self-management program called "Health Extension for Diabetes" in collaboration with partners from the Public Health Science Department at Clemson and clinical partners at Prisma Health. The program has been recognized as one of 10 "practice-tested" diabetes education and support programs in the country by the American Diabetes Association. She created and pioneered the WalkSC program, which has reached thousands of participants in South Carolina and beyond. Parisi has led two Creative Inquiry classes and a Capstone Project in the Computer Science Department for the development of the WalkSC mobile app.

She has overseen multiple UPIC students and graduate students completing internships for experiential learning. Parisi currently has two PhD students and is mentoring a postdoctoral research associate in research methods for health and nutrition programs through Extension.

Select Accomplishments

- Team award for the Live Healthy South Carolina, 2022 State Impact Award for the Health Extension for Diabetes Program by the SC Alliance for a Healthy SC.
- Worked with Clemson Legislative Affairs to secure recurring state funds in FY2022.
- Awarded the Team Award for the Healthy Me, Healthy SC COVID testing and vaccination initiative in 2020.

College of
ARCHITECTURE, ARTS AND HUMANITIES

Claire Kirwin, PhD

Assistant Professor

Philosophy

Kirwin's research focuses on the nature of value (ethical, aesthetic, and beyond) and our relationship to it as minded creatures. Currently, she is writing about moral knowledge, value pluralism, alienation, and whether value is real (it is). Kirwin's work on these contemporary topics is informed and influenced by many figures from the history of philosophy, especially Plato, Kant, and Nietzsche.

Kirwin came to Clemson in 2020 and is an assistant professor in the Department of Philosophy. She has a Ph.D. in Philosophy from the University of Chicago (2019).

Select Accomplishments

- 'Value Realism and Idiosyncrasy' (runner-up for the Marc Sanders Prize in Metaethics) *Oxford Studies in Metaethics*, Vol. 18 forthcoming.
- 'Pulling Oneself up by the Hair: Understanding Nietzsche on the Freedom of the Will.' *Inquiry*, Vol. 61, pp. 82-99, 2017.
- 'Why Sibley is (Probably) Not a Particularist After All.' *British Journal of Aesthetics*, Vol. 51, pp. 201-212, 2011.
- Review of Mattia Riccardi, Nietzsche's Philosophical Psychology, *Journal of Nietzsche Studies,* forthcoming.
- Internet *Encyclopedia of Philosophy*, https://iep.utm.edu/nietzsches-ethics/, 2022.
- Review of Andrew Huddleston, *Nietzsche on the Decadence and Flourishing of Culture Mind*, forthcoming in print, advance online access 2021.
- Review of Peter J. Conradi, *Iris Murdoch – A Writer at War, Oxonian Review* 12:4, 2010.
- 'Worlds Collided: Love as Seeing and Seeing-With,' committed for presumptive publication in *Oxford Studies in Normative Ethics*.
- 'After Birth: Middle and Late Nietzsche on the Value of Tragedy,' committed for presumptive publication in a special issue of *Inquiry*.
- 'Normativity from the First-Person Perspective,' commissioned for an edited collection on normative realism, eds. P. Boghossian and C. Peacocke.

College of
BEHAVIORAL, SOCIAL AND HEALTH SCIENCES

Amira Jadoon, PhD

Assistant Professor

Political Science

Jadoon is a political scientist who studies the effectiveness of international security and policies, as well as the various causes and consequences of political violence and terrorism. Prior to joining Clemson, she worked at the U.S. Military Academy at West Point, jointly appointed in the department of Social Sciences and the Combating Terrorism Center.

Jadoon's work examines the direct and indirect consequences of international security tools (such as foreign aid and sanctions) on target states' internal conflict dynamics, as well as the wide-ranging effects of counterterrorism tactics such as leadership decapitation. She has done extensive research on the organizational and environmental factors driving the behavior of terrorist and insurgent groups, both globally as well in the Afghanistan-Pakistan region, with a focus on inter-group cooperation and rivalries between local militant groups and transnational terrorist organizations. Jadoon is also known as one of the foremost experts on the Islamic State Khorasan, one of Islamic State's most lethal global affiliates. Finally, her work also examines the effects of political violence on human security, as well as women's engagement with violence and extremism. Her research has been supported by the Carnegie Corporation of New York, the United States Institute of Peace, and Evidence in Governance and Politics (EGAP). Jadoon teaches courses on Terrorism and Violent Extremism, Counterterrorism Strategies, and International Conflict in the political science department.

Select Accomplishments

- Named as one of 50 honorees in the *2022 U.S. National Security & Foreign Affairs Leadership List* announced by the Center for Strategic and International Studies & Diversity in National Security Network.
- Published (or accepted) five peer-reviewed journal articles, one book chapter, and one book manuscript.
- Published 14 policy articles/monographs/op-eds via various think tanks, research centers, and news/media outlets.
- Served as a speaker/panelist/interviewee at 15 in-person/online events within the United States and overseas (including Israel and Singapore), and participated in four academic conferences.
- Co-founded the West Point Journal of Politics & Security in 2021 to showcase research by undergraduate students in the United States and abroad.

Wilbur O. and Ann Powers College of BUSINESS

Travis Box

Assistant Professor

Finance

Box has a wealth of experience in finance, statistical modeling, and econometrics. His research focuses on a broad range of investment topics with an emphasis on the burgeoning ETF market and other passive investment products. He joined Clemson faculty in 2019.

Box also teaches various courses in the Clemson MBA program and Finance Department. Always seeking opportunities for experiential learning, students in his MBA Investment Banking Valuation Strategy course are asked to evaluate the fairness of real-world investment banking transactions. Likewise, MBA Capital Markets & Investment Management course participants manage and report on portfolios of foreign and domestic stocks and bonds, options, futures, mutual funds, and ETFs. Finally, students in his MBA Introductory Python for Business Applications class apply their newly acquired coding skills to real-world challenges in their own workplace.

Box earned his Ph.D. from the University of Arizona.

Select Accomplishments

- Published in some top academic finance journals, including the *Journal of Financial Economics*, the *Journal of Banking & Finance*, and *Financial Management*.
- Recognized with the American Association of Individual Investors' Outstanding Paper in Investments award.
- Received the *Journal of Financial Research* Outstanding Article Award for Best Paper Published
- Named the Wilbur O. and Ann Powers College of Business MBA Professor of the Year.
- Box, T., Davis, R. L., & Fuller, K. P. (2019). ETF Competition and Market Quality. *Financial Management*.
- Box, T., Davis, R., Hill, M., & Lawrey, C. (2018). Operating Performance and Aggressive Trade Credit Policies. *Journal of Banking and Finance*.
- Box, T. (2018). Qualitative Similarity and Stock Price Comovement. *Journal of Banking and Finance*.
- Box, T. & Griffith, T. (2016). Price Clustering Asymmetries in Limit Order Flows. *Financial Management*.

College of EDUCATION

Liz Boyd, PhD

Clinical Assistant Professor

Education and Human Development

Boyd is the program coordinator for the Counselor Education Master of Education (MEd) and Education Specialist (EdS) clinical mental health and school counseling programs in the Department of Education and Human Development. In addition, she serves as the liaison to the Council for Accreditation of Counseling and Related Educational Programs (CACREP) and is currently leading the reaccreditation process to be completed in fall 2023. Boyd's research interests include women's mental health, substance use disorders prevention and treatment, and community mental health access. Aligning with her research interest is her passion for diversity, equity, and inclusion. She is the lead instructor for the multicultural counseling course, where students consistently remark on the cultural growth they experience throughout the course. She is also a Qualified Administrator for the Intercultural Development Inventory, which is an assessment used to improve intercultural competence and bridge cultural differences to strengthen relationships. Boyd is a co-PI on an Expansion of Practitioner Education Grant through Substance Abuse and Mental Health Services Administration (SAMHSA) that is focused on integrating substance use training throughout the counselor education curriculum.

Beyond the Clemson campus, Boyd has presented research at national and regional conferences, including the Southern Association for Counselor Education and Supervision Conference, the Association for Assessment and Research in Counseling Annual Conference, and the National Youth Advocacy and Resilience Conference. She has also reviewed program and grant proposals for the Southern Association for Counselor Education and Supervision.

Select Accomplishments

- Wymer, B., Swartz, M. R., Boyd, L., Zankman, M., & Swisher, S (2022). A content analysis of parental engagement literature, *Journal of Child and Adolescent Counseling*.
- Boyd, L., Burgess, M., Lund. S., & Scott, D. A. (2021). Assessment, Diagnosing, and Theory. In D. A. Scott & M. G. Scott (Eds.), *Psychopathology: A case-based approach*, Cognella.
- Expansion of Practitioner Education Grant, Substance Abuse and Mental Health Services Administration (SAMHSA), Co-PI ($198,762). September 2020- September 2023.
- College of Education Associate Dean of Research Grant, Clemson University, Co-PI ($9,884), An Exploration of a Rural Community Response to Youth Impacted by the Opioid Epidemic, September 2020 - September 2021.

College of
ENGINEERING, COMPUTING AND APPLIED SCIENCES

Diana Vanegas, PhD

Assistant Professor

Environmental Engineering and Earth Sciences

Vanegas is an assistant professor of biosystems engineering at Clemson University. She earned her Ph.D. in Agricultural and Biological Engineering from the University of Florida in 2015. Prior to joining Clemson in 2019, she worked as an assistant professor in the Food Engineering Department at Universidad del Valle (Cali, Colombia).

Vanegas' research interests include biosensors development for environmental health, water pollution assessment, and pollution exposure in vulnerable communities. Her recent work includes the development of biosensors for SARS-CoV-2 monitoring in saliva, assessment of mercury pollution in artisanal and small-scale gold mining communities, and development of nano-sensors for monitoring traces of organophosphorus pesticides in water sources impacted by agricultural activities.

Vanegas is interested in engineering solutions to technological challenges related to food and agriculture in settings of low resource and marginalization. She is focused on integrating and adapting technologies to support sustainable food systems, and her program spans the United States, Colombia and China. Current projects involve development of low-cost nanosensors for detecting environmental contaminants affecting rural communities in South America (e.g. mercury from artisanal gold mining, and glyphosate from large-scale monoculture agriculture), as well as development of low-cost hydroponic systems for restoring food sovereignty in places where lack of space, and access to healthy soil are limiting the ability of ancestral communities to grow culturally-relevant crops. Due to the nature of her research, Vanegas' team is highly transdisciplinary.

Select Accomplishments

- Principal investigator (PI) of a National Institutes of Health grant for developing SARS-CoV-2 biosensors (2020-2022).
- Co-PI of a National Science Foundation grant for developing integrated systems for decentralized water treatment and food production (2022-2025).
- Author of seven peer-reviewed research articles in 2022.

College of SCIENCE

Renee Lyons, PhD

Director of Science Outreach

College of Science

Lyons is partnering with university, K-12, community, and industry partners to addresses an immediate challenge for the field of STEM education: the need to increase diversity, equity, and inclusion. Thanks to a $1.9 million-dollar grant from the National Science Foundation, Lyons is leading the development of a graphic novel, which tells the true story of an African American community harnessing the power of STEM technology to advocate for clean air and water. She has partnered with Urban League of the Upstate and Littlejohn Community Center to develop an after-school STEM club curriculum, which engages youth in the graphic novel, social justice-oriented STEM investigations, STEM mentoring, story writing, and the development of community action plans. This STEM Club will be offered at three locations throughout the Upstate and impact hundreds of African American middle school youth. Lyons and her team will create science educational experiences that are spaces of hope, where African American communities use science to bring lasting change to their environments. Lyons' research and work rely on youth leadership and voices to share with the entire STEM ecosystem ways to better support and engage African American youth in STEM fields.

Lyons also supports K-12 educators throughout the state of South Carolina through professional development. The state of South Carolina recently adopted new science standards, and K-12 teachers have expressed the need for professional development to help them understand what the new standards look like in practice. Lyons has responded by partnering with District 5 of Lexington and Richland counties to develop model lessons for teachers throughout the state. These model lessons demonstrate to teachers how to integrate the three dimensions of science into their everyday teaching practices. Lyons is sharing these model lessons in face-to-face training with teachers and district science coordinators; and through the SC Department of Education's online database of educational resources for teachers. Through her efforts, thousands of K-12 students will have access to high-quality science instruction.

Select Accomplishments

- Recipient of National Science Foundation/Advancing Informal STEM Learning award.
- More than $3 million in extramural research funding ($1.9 million personal share).
- Led Science Outreach Center to see 90% increase in number of K-12 students visiting Clemson and engaging in hands-on STEM labs.
- Led Science Outreach Center to see 104% increase in Science Outreach Center revenue, which funds outreach events and activities.

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April 2023